



# NEW YORK STATE WATER RESOURCES INSTITUTE

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## Hudson Estuary Watershed Resilience Project

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Catskill Creek at Woodstock Dam during low flow (L) and flood conditions (R)

### Abstract (word limit - 200)

In 2014 the Hudson River Estuary Watershed Resilience Project supported collaboration across Cornell Cooperative Extension (CCE) of Columbia-Greene, Dutchess, and Orange Counties to address the challenges of flooding, stream and watershed management, and climate change. This partnership between the New York State Water Resources Institute (NYS WRI) at Cornell University and Cornell Cooperative Extension (CCE) is supported by the New York State Department of Environmental Conservation's Hudson River Estuary Program (HREP). Project website: <http://hudsonestuaryresilience.net>

### Major Accomplishments

**Stream Dynamics Trainings** – The CCE collaboration revised a fluvial geomorphology presentation that was developed in 2013 for highway personnel to make it suitable for planning board audiences. The revised version of the presentation was delivered at seven locations in Greene, Columbia, Dutchess and Orange Counties. The

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Stream Dynamics trainings were offered in partnership with Regional Planning Councils, and targeted at planning board audiences. Several partners were involved in providing portions of the trainings, including the Hudson River Estuary Program, Hudsonia, AKRF Environmental Planning Firm and the Orange County Water Authority.

**Dam Safety and Removal** – The CCE collaboration worked in partnership with the Hudson River Estuary Program and NYS DEC Dam Safety Division to review literature related to dams, dam safety and dam removal. The team produced a tri-fold brochure on the benefits of reconnecting streams through dam removal for targeted distribution to dam owners in the Hudson Valley. The team also delivered two seminars on dam safety and removal, one in the Rensselaer County town of Sand Lake and the second in the Orange County town of Blooming Grove.

**Seminars and Conferences** – The CCE collaboration delivered a series of five seminars on flood related topics in 2014. Planning and hosting the seminars involved partnering with many organizations, including the Hudson River Estuary Program, Scenic Hudson, NYS DEC Office of Floodplain Management and the venues where the seminars were held, which included town halls and college campuses. The CCE collaboration also provided assistance to partners hosting conferences and trainings by providing presentations or assistance in securing speakers and venues. CCE worked with the Cornell Community and Rural Development Institute (CaRDI), Cornell Local Roads, Hudson River Watershed Alliance and the Hudson Valley Regional Council.

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### Introduction

Background and project need, audiences and relevance

Extreme weather, such as Tropical Storms Irene and Lee, and Hurricane Sandy have pointed out the need for communities to become more ready to respond effectively to flood events. The Hudson Estuary Watershed Resiliency Project (HEWRP) was established to deliver educational messages regarding flood readiness, stream dynamics and flood response in streams to audiences in the Hudson Valley.

The audience for the HEWRP is municipal officials, highway personnel and landowners in target watersheds in the Hudson Valley.

Although flood risk in the Hudson Valley is a long-standing issue, an increase in very heavy precipitation events is creating a greater need for communities to develop a more resilient approach to flood readiness and response. A needs assessment conducted by the Cornell Human Dimensions Research Unit and the Hudson Valley Cornell Cooperative Extension team points to the relevance of this project to communities in the Hudson Valley. The assessment indicates that while many municipal officials understand that flood risks are increasing, most communities are not yet addressing vulnerabilities to flooding. Furthermore, post flood response in streams after Tropical Storms Irene and Lee were often well-intentioned but poorly executed, which points to a need for greater understanding of fluvial geomorphology in target audiences. This project is relevant from a perspective of promoting community well-being and readiness, as well as protecting the integrity and functioning of stream systems in the Hudson Estuary watershed.

### Program Description

Partners & collaborators, key elements of program, project goal(s), geographic area served by project (if applicable).

During 2014, the Hudson Valley Cornell Cooperative Extension (CCE) regional team delivered a comprehensive flood outreach initiative to target audiences. CCE of Columbia & Greene counties coordinated the effort to plan and deliver the HEWRP, working in partnership with CCE associations in Dutchess and Orange counties, NYS Water Resources Institute (WRI), the Hudson River Estuary Program, Cornell University and many other partners. Collaborators included AKRF Environmental Planning, CaRDI, Cornell Local Roads, Hudsonia, Hudson River Watershed Alliance, Hudson Valley Regional Council, NYS DEC Office of Floodplain Management and Dam Safety Division, Orange County Water Authority, Scenic Hudson, SUNY New Paltz and a range of municipalities. The CCE team collaborated with the Cornell Human Dimensions Research Unit to analyze and communicate results from a riparian landowner survey that was completed in 2013.

Key elements of the program included outreach to municipal officials and highway personnel on topics related to streams and flooding. Outreach methods included seminars, conferences, presentations, trainings, print materials and website development.

The project goal is to develop capacity in Hudson Valley municipal officials, highway personnel, and riparian landowners to implement watershed resiliency strategies to minimize future flooding impacts, while also properly responding to storm impacts to streams and adjacent and associated infrastructure.

The geographic area served by this regional project included targeted watersheds in Albany, Columbia, Dutchess, Greene, Orange, Rensselaer, Schoharie and Ulster counties.

*This report was prepared for the New York State Water Resources Institute (WRI) and the Hudson River Estuary program of the New York State Department of Environmental Conservation, with support from the NYS Environmental Protection Fund.*

## Project Methods

Needs assessment (if applicable), audience characterization, literature review, educational materials development or adaptation, types of outreach employed in the project.

Development of the HEWRP was influenced by the results of a municipal needs assessment that was conducted by the Cornell Human Dimensions Research Unit (HDRU) in 2013.

In 2014, the CCE regional team worked with the Cornell HDRU to characterize the landowner audience, based on the results from the 2013 survey, and create a landowner outreach logic model, which will serve as the basis of a landowner outreach plan in the future.

An ongoing review of literature relevant to watershed management outreach, especially flooding, floodplain management, and aquatic barrier mitigation was conducted to assure that the most relevant and current information is shared with audiences.

The CCE team created new outreach materials in 2014, including a brochure highlighting the benefits of dam removal, and a stream-related resource list for municipalities. (See Appendix A for outreach materials, as well as maps and charts created while researching the dam literature). The team worked with Ted Ed to create an animated video on fluvial geomorphology that is still under development.

The CCE team continued to revise and improve outreach materials that were developed in 2013. The Streams 101 presentation was revised to increase its suitability for a planning board audience. The website was scrutinized for clarity, revised, and updated on a regular basis. (For summary of the Resiliency Project website usage, see Appendix B). The Lower Hudson Coalition of Conservation Districts' Municipal

Flood Guide, was revised, re-formatted and printed for distribution.

The CCE team utilized a variety of tools to conduct outreach to audiences, including the website, email communication, mailings and print media. The primary mechanism for educational programming has been seminars, presentations and trainings held at town halls, colleges and other public venues.

The CCE team provided seven stream dynamics trainings in 2014. The one-hour stream dynamics training was paired with presentations by partners on topics related to planning, zoning and watershed management.

The CCE team organized, promoted and hosted five seminars on flood-related topics, including Forests & Wetlands for Flood Management, Scenic Hudson's Sea Level Rise Mapper, the FEMA National Flood Insurance Program and Dam Safety & Removal. Additionally, the CCE team partnered with Cornell Local Roads to provide a stormwater training, the Hudson Valley Regional Council to provide a Green Infrastructure for Stormwater Management Training, WAMC Northeast Public Radio to provide a showing of the film *Damnation*, and provided assistance to CaRDI and the Hudson River Watershed Alliance in conference planning.

The CCE team supported initiatives of the Hudson River Estuary Program throughout the year. CCE staff assisted the Trees for Tribs program by monitoring planting sites in the Catskill Creek watershed. CCE staff also conducted riparian plantings on two small sites on flood damaged sections of the Bowery Creek. CCE staff assisted the culvert assessment project by helping to connect Estuary Program staff with local municipal partners. The CCE staff conducted informal interviews with officials in municipalities participating the FEMA

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Community Rating System (CRS) program to assist the Estuary Program in evaluating the suitability of CRS for Hudson Valley towns. CCE staff participated in the Village of Catskill Waterfront Flooding Task Force, an initiative supported by the Hudson River Estuary Program.

### Impacts and Results

Numbers served, knowledge gained, behavior changes, audience feedback

Over the course of 2014, the Hudson Valley CCE regional team delivered 745 hours of instruction to a total of 304 individuals. Training was received by 135 municipal officials, representing 81 municipalities.

The Hudson Estuary Watershed Resiliency Project was very well received by target audiences, with 87% of respondents indicating that the program content was useful to them.

Evaluations conducted with program attendees included content questions that were asked pre and post training. Analysis of responses indicate a consistent increase in knowledge amongst attendees. For example, attendees of the Stream Dynamics training had an average knowledge gain of 50%. There was a 67% increase in attendee knowledge from pre- to post-evaluation on the following topic: *Methods to promote stream stability and water quality*; and a 60% increase in knowledge on the topic: *Methods to minimize flood impacts on communities and the environment.*

Attendees to the Dam Safety and Removal seminars had an average percent knowledge

gain of 62%. There was an 88% increase in attendee knowledge from pre- to post-evaluation on the following topic: *Resources available for dam removal* and an 83% increase in attendee knowledge from pre- to post-evaluation on: *Benefits of connected streams.*

For a detailed analysis of evaluations conducted in 2014, see Appendix C.

### Policy Implications

Discuss policy implications of your outreach. Describe how this outreach interfaces with existing and proposed laws/regulations or community actions.

Potential long-term policy implications of the HEWRP include changes to zoning and code to include wetland and riparian buffer ordinances, and wiser floodplain management and post flood response in streams. Policies regarding stormwater management, participation in the FEMA Community Rating System and placement of roadway infrastructure near streams may also be impacted over the long term.

### References:

#### Appendices (if needed):

Please note that a compilation of all supporting materials can be found at *HREP Watershed Resiliency>2014> Reports>Year End Reports*.

Appendix A – Outreach Materials

Appendix B – Website Summary

Appendix C – 2014 Evaluation Summary

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